

# ALLOPHONES OF THE VOWEL /a/ IN ISTRO-ROMANIAN. AN ACOUSTIC ANALYSIS<sup>1</sup>

LARISA-FLORENTINA NICOLAIE<sup>2</sup>

**Abstract.** This paper proposes an acoustic analysis of the phonological variants that the vowel /a/ has in Istro-Romanian. It is also an attempt to establish some correlations between the stressed vowel /a/ in two Eastern Romance varieties, Istro-Romanian (IR) and Daco-Romanian (DR). The acoustic analysis will provide some answers for our two research questions: (i) Is the phonological variant /ã/ a single phoneme or a two-phoneme structure?, (ii) Are there any similarities between the stressed vowel /ã/ in Istro-Romanian and the diphthong /ɔa/ in Daco-Romanian?

**Keywords:** phonetics, phonology, allophones, Istro-Romanian, Daco-Romanian, stressed vowel, acoustic analysis.

## 1. INTRODUCTION

The present paper represents an acoustic analysis of the phonological variants that the vowel /a/ has in Istro-Romanian, built on an oral corpus extracted from *Harta sonoră* (2014), *Limba de saka zi* (2011), [www.vlaski-zejanski.com](http://www.vlaski-zejanski.com), and a recording made by Ionuț Geană in New York in 2018. It is also an attempt to establish correlations between the two Eastern Romance varieties, Istro-Romanian and Daco-Romanian.

The main objective of this study is to perform an acoustic analysis, using PRAAT, with which we will propose the phonological variants of the vowel /a/ in the two varieties of Istro-Romanian, northern, represented by Žejane, and southern, illustrated by recordings from Šušnjevića. The recording provided by Ionuț Geană is by an Istro-Romanian woman, from Žejane, aged 70 at the date of recording, who had settled in New York, United States of America, at the beginning of the 1950s. Various phonological contexts were selected, contexts in which the vowel appears in stressed position /ã/, but also appears in unstressed position as /a/. The selected words were: *čâsta* ‘this’, *măja* ‘mother’, *pătru* ‘four’, *șăse* ‘six’, *frâte* ‘brother’, *muljâra* ‘woman’, *kârne* ‘meat’, *văka* ‘cow’, *bânka* ‘bench’, *âpa* ‘water’. The second objective of this paper is to capture the way in which the vowel /a/, of Daco-Romanian, behaves in the context in which it is preceded by the semivowel /ɔ/, regarding to the quality of roundness. The words chosen for the analysis are: *ploaie* ‘rain’, *soare* ‘sun’, *oameni* ‘people’, *oală* ‘pot’. In all these examples, the vowel /a/ is stressed.

---

<sup>1</sup> This work was supported by a grant of the Romanian Ministry of Education and Research, CNCS - UEFISCDI, project number PN-III-P1-1.1-TE-2019-0832, within PNCDI III.

<sup>2</sup> PhD student, Faculty of Letters, University of Bucharest and “Torgu Iordan – Alexandru Rosetti” Institute of Linguistics of the Romanian Academy, [larisanicolaie@yahoo.com](mailto:larisanicolaie@yahoo.com).

This acoustic research tries to answer two questions: (i) Is the stressed vowel /â/ a single phoneme or a two-phoneme structure?, (ii) Are there any similarities between the stressed vowel /â/ in Istro-Romanian and the diphthong /qa/ in Daco-Romanian?

## 2. PERSPECTIVES ON THE VOCALIC SYSTEM IN ISTRO-ROMANIAN

According to Kovačec (1971: 33–36), to interpret the vocalic system both geographical area and stress have to be taken into account. Istro-Romanian as spoken both in the north and the south has a vocalic system consisting of:

- a) 8 phonemes in stressed position, which are divided into three series of localizations, with three degrees of vowel height:

	front	central	back
<b>closed</b>	i		u
<b>open-mid</b>	e	ɚ	o
<b>open</b>	ɛ	a	â

- b) 6 phonemes in unstressed position:

	front	central	back
<b>closed</b>	i		u
<b>open-mid</b>	e	ɚ	o
<b>open</b>		a	

- c) In the northern variety, the most open vowel in the front series, /ɛ/, and the back series, /â/, can only appear in stressed position, whereas in the south the former can also cover an unstressed final position, so the unstressed vocalic system contains 7 phonemes:

	front	central	back
<b>closed</b>	i		u
<b>open-mid</b>	e	ɚ	o
<b>open</b>	ɛ	a	

Kovačec (1971: 33–36) states that /a/ is the most open vowel of the central group. It is said to be the most open vowel of the Istro-Romanian vocalic system which means that the degree of vowel height is greater than that of its variant /â/. The vowel /a/ can be found in unstressed syllables but also in stressed ones when the words are loans from Croatian or Italian. Its variant /â/ is the most open of the back series and it can only appear in stressed syllables.

A peculiarity of Istro-Romanian, as Avram (1977: 592) argues, is the transformation of /a/ into /â/ as a result of its status as a stressed vowel. He thinks that no opposition can be established between the two, as they are in a complementary distribution.

Another interpretation of the vocalic system, supported by Petrovici (1967: 10) and Kovačec (1971: 40; 1984: 554), states that the existence of stressed /a/ can be explained by the fact that it is preserved in unadapted loans from Italian and Croatian.

Kovačec (1971: 76) found that the two vowels are used in various situations to mark a semantic differentiation (*yrânița* – ‘small branch’, *yrânița* – ‘border’). Therefore, the two vowels must be treated as distinct, because there is no formal criterion by which it can be established when /â/ appears in a stressed syllable and when the other /a/ appears. The choice is made by the speaker. This paper will not discuss any contexts in which the unrounded stressed vowel appears, and we shall focus only on the two variants, the stressed and the unstressed vowel /a/.

Pușcariu (1926: 62) notices that the change from /a/ into /â/ took place in the seventeenth century as suggested by Ireneo’s writing *copra* ‘goat’ which is pronounced *câpra*. Pușcariu thinks that the phenomenon happened after the settlement of the Istro-Romanians in Istria, being the result of language contact and it has nothing to do with the similar phenomenon encountered in some areas of Banat, Țara Hațegului or Oltenia.

In the south, there are situations in which the unstressed /a/ found in initial position drops (e.g. *flâ* ‘find out’) but in the north it is kept (*afâra* ‘out’).

Sârbu (1998: 19) notes that if the Istro-Romanian vowel /a/ is stressed, then it has this characteristic of roundness. This has led us to choose a few words from Daco-Romanian in which the stressed vowel is preceded by the semivowel /ɔ/ thus forming the diphthong /ɔa/. The selected words are *ploaie* ‘rain’, *soare* ‘sun’, *oameni* ‘people’, *oală* ‘pot’. We wanted to see whether there were any similarities between these phonemes in Istro-Romanian and in Daco-Romanian.

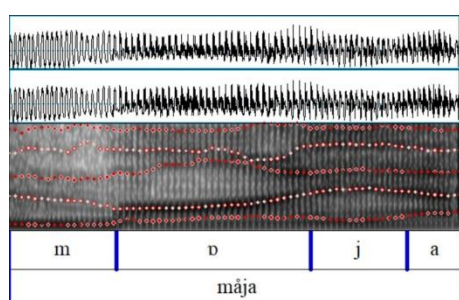
### 3. DATA ANALYSIS

The acoustic analysis was made in PRAAT and it tries to establish the values of the first (F1) and the second (F2) formants within the stressed vowel that appears in various consonantal contexts, such as: nasal /m/ (*mâja* ‘mother’), fricatives /ʃ, v/ (*șăse* ‘six’, *vâka* ‘cow’), plosives /k, p, b/ (*kârne* ‘meat’, *pâtru* ‘four’, *bânka* ‘bench’), affricate /tʃ/ (*căsta* ‘this’) and a *muta cum liquida* context (*frâte* ‘brother’). There are also examples in which the stressed vowel /â/ is in initial position (*âpa* ‘water’) or appears in a word that has more than two syllables (*muljâra* ‘woman’). There are six examples that contain an unstressed /a/ and we will try to examine whether there are any differences between the two. Before going further into the acoustic analysis, we must say that the vowels differ in the frequencies of their two formants F1 and F2. The frequency of F1 is determined by the height of the tongue whereas that of F2 is determined by the frontness/ backness of the tongue body. That is, the higher the frequency for the first formant the lower the vowel is and the lower the formant, the higher the vowel is. If F2 has a low frequency, then the vowel is back, but if it is high, the vowel is front. The acoustic analysis was performed on the basis of an oral corpus as mentioned earlier.

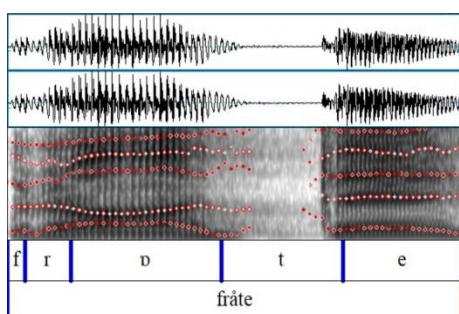
We will structure this acoustic analysis into three parts, one that captures the behaviour of the vowel in the recordings from *Limba de saka zi* (2011), *vlaski zejanski.com*, another in which we discuss the differences that appear between the variants correlated with the geographical area and a last part in which we compare the stressed vowel /a/ of Istro-Romanian to diphthong /ɔa/ of Daco-Romanian.

### 3.1. The northern variants

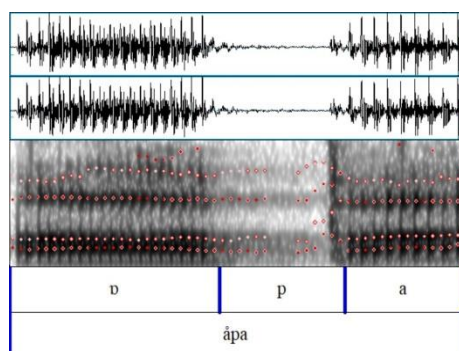
We will begin with the recordings from Žejane, the northern area. We will use the spectrograms for three words, *mâja*, *frâte* and *âpa*, and for the rest of the examples there is a table below that shows the values of the formants.



The word *mâja* contains the phoneme /a/, which appears both in stressed and unstressed position. The spectrogram illustrates the behaviour of the phoneme /a/ in terms of the level at which the formants appear. Thus, for /â/, the values are the following: F1=527Hz, while F2=1175Hz, and for /a/, F1=777Hz and F2=1270Hz. The different values can support the idea that the vowel /a/, in unstressed position, is more open than its stressed counterpart. The small values for the second formant indicate that both variants are close to back vowels. The difference between the two formants becomes bigger at the end of the production of the vowel as we are going to see in the next example, but not in the third one.



In the word *frâte*, the values of F1 and F2 are: F1=651Hz, F2=1257Hz. The spectrogram shows that in the first part of the utterance the formants are getting closer, but then, as we saw earlier, F1 tends to get lower while F2 gets higher. Comparing the values of the two examples we can see that those for F1 are greater in the second example, as for F2, they are a bit smaller. This means that in the form *frâte* the stressed vowel is more open than in the word *mâja*. The second formant shows that the vowel is again closer to the back series.



The last example of this part is *âpa*, where the stressed vowel is the first phoneme of the word. If we look at the spectrogram we can see that there is no change at the level of formants. They do not have an ascending or descending contour and both of the variants have a similar behaviour. The value for F1 is 691Hz for the stressed vowel and 707 Hz for the unstressed vowel, whereas F2 is 1067Hz for /â/ and 1168Hz for /a/. That means that both of them are open and that they are also close to the vowels of the back series because frequency for F2 is very low in both cases.

If we compare the values of the variants in these three examples, we see that the greatest value of the first formant appears in the third situation, when the stressed vowel is

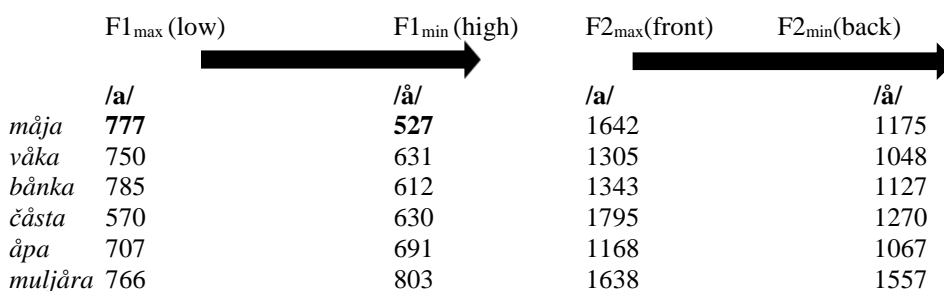
the first in the word. This could mean that /â/ is the most open in these examples. Regarding the value for the second formant, it is also the lowest in the third example, so the stressed phoneme /â/ is closer to the back series in the word *âpa* than *mâja* and *frâte*.

The two forms that contain the unstressed vowel /a/ illustrate that this phoneme is more open than /â/, looking at the first formant. For F2 the differences are not so great.

*Table 1*

VOWEL	CONTEXT	F1 (Hz)	F2 (Hz)
/â/	m_ja	527	1175
	š_se	594	1214
	v_ka	631	1048
	k_rne	627	1197
	p_tru	605	1127
	b_nka	612	1127
	č_sta	630	1270
	fr_te	651	1257

*Table 1* summarizes the acoustic analysis. As shown above, we can see that the values at the level of the formants are different every time. It seems that the most similar values for F1 are shown in the words: *čâsta*, *vâka*, *kârne*, the lowest value is in the word *mâja* which means that it is more like /o/. On the other hand, the greatest value is in *frâte* which could be the effect of a *muta cum liquida* structure. At the level of the second formant the greatest values are in examples *čâsta* and *frâte*, which means that the stressed vowel is not really a back vowel. The term *vâka* illustrates a value of only 1048Hz for F2 which means that it is closer to a back vowel.



*Fig. 1*

*Fig. 2*

*Figures 1 and 2* show the values of the two formants, F1 and F2, for the unstressed vowel /a/ and the stressed vowel /â/, values that capture the differences between the two variants. According to the values of F1, the unstressed vowel tends to be an open one, while the stressed vowel seems to be more like the mid-open one. The values of the second formant show that /a/ is closer to the central series, as opposed to /â/ which seems to belong to the back series.

### 3.2. A word and three variants

We now give a comparison between the variants of the vowel /a/ in the northern area, represented by the village of Žejane and Šušnjeвица, in the south. This is also an attempt to observe how a woman from Žejane, who settled in America 50 years ago, speaks.

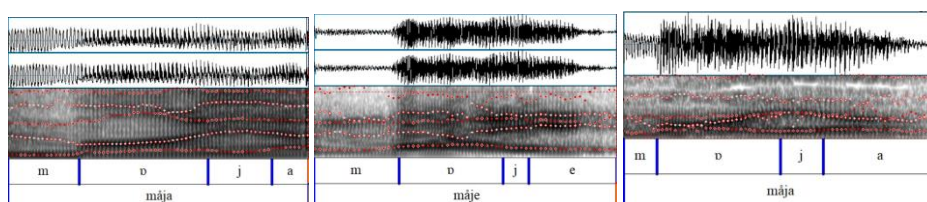


Fig. 3

Fig. 4

Fig. 5

**Figures 3, 4, 5** show how the same word *mája* can differ in terms of frequency when the speakers belong to different areas. In **Figure 3**, the spectrogram illustrates the northern variety, in which we are able to see that the line of the formants, which is in red in the images, does not change. The values for F1 and F2 that appear in **table 2** indicate that the stressed vowel /â/ is not as open as its unstressed variant /a/ and it is closer to the back series. **Figure 4** does not show the same behaviour, there are some fluctuations and the values are very high, which means that /â/ does not have the same characteristics, in that it is much lower and does not come closer to the back series. The last example is evidence that the woman who is living in New York does not make a great difference between stressed and unstressed variants and that, for her, /â/ is an open vowel like /a/ and somewhat rounded, due to the fact that the F2 frequency is 1225Hz.

**Table 2**

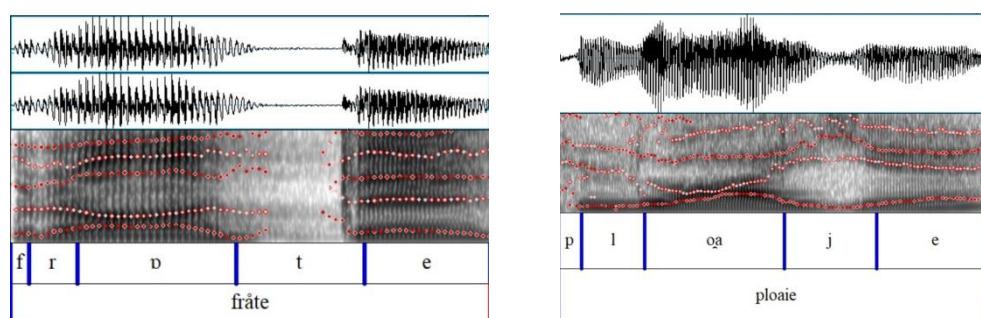
Variety <sup>3</sup>	/â/		/a/	
	F1	F2	F1	F2
N	527Hz	1175Hz	777Hz	1642
S	810Hz	1656Hz		
NY	719Hz	1225Hz	646Hz	1505Hz

Comparing the values of the formants, we could say that the northern variety offers a better illustration of the stressed vowel which does not seem to be as open as its unstressed counterpart and that it behaves like a the back vowels due to the low frequency for F2. Thus, in this analysis, the northern variety shows this peculiarity of a rounded /a/ better.

<sup>3</sup> The varieties have the following order: *N* - north, *S* - south and *NY* - the woman who lived in Žejane but moved to America 50 years ago.

### 3.3 A comparison to Daco-Romanian's diphthong /ɔa/

The last section of this acoustic analysis tests whether there are any similarities between the stressed vowel /â/ in IR and the diphthong /ɔa/ in DR. We have chosen to illustrate their behaviour, using the words *frâte* for IR and *ploaie* for DR. The values for the other forms are in *table 4*.



Looking at the spectrograms we can see that the contour of the formants follows the same steps in both examples. We have a descending contour for F2 and then a small difference at the level of both formants and in the end an ascending contour for F2 and a descending contour for F1. Even at the level of the values we cannot see a major difference but it exists and it tells us that the diphthong is more open and more central than the stressed vowel. And still the red line proves to us that at the level of diphthong we have increasing values for F1 which means that it becomes more and more open and that at the beginning we have a mid-open vowel and at the end an open one. At the level of the stressed vowel we cannot see this increase, thus it is not an open vowel.

*Table 3*

	F1 (Hz)	F2 (Hz)
/â/	651	1257
/ɔa/	700	1339

The other forms show the same behaviour but the values of the frequencies are rather smaller for F1 and bigger for F2 in words like *oameni* or *oală* where the diphthong is in the first position.

*Table 4*

	F1 (Hz)	F2 (Hz)
/sɔare/	672	1271
/ɔameni/	559	1412
/ɔală/	582	1594

#### 4. CONCLUSIONS

The acoustic analysis has helped us to get some answers for our two research questions: (i) Is the phonological variant /â/ a single phoneme or a two-phoneme structure?, (ii) Are there any similarities between the stressed vowel /â/ in Istro-Romanian and the diphthong /ɔa/ in Daco-Romanian?.

(i) The answer to the first question is that the phonological variant /â/ is a single phoneme structure with a characteristic of roundness, as shown by the fact that the frequency value for the first formant does not show the ascending contour that we saw in the example from DR.

(ii) Regarding the two Eastern Romance varieties, IR and DR, the diphthong /ɔa/ of DR behaves in a different way from the stressed vowel /â/ of IR, and that is at the level of the frequency. In DR we can see an increasing contour for F1 and F2 whereas in IR the frequency values have small fluctuations.

We also discovered other things through the acoustic analysis:

- The variants of the phoneme /a/ in IR are different in terms of the level at which the formants F1 and F2 appear. The stressed vowel is close to the back vowels whereas /a/, the unstressed vowel, had levels of the two formants at which the phoneme /a/ in DR appears.
- The northern variety of the IR shows a greater roundness of the stressed vowel.

#### SOURCES

Vrzić, Zvezdana, 2011, *Limba de saka zi* (Everyday Language), Tragovi (CD).  
www.vlaski-zejanski.com

#### REFERENCES

- Avram, A., 1977, "Observații asupra fonemelor vocalice ale dialectului istroromân", *Studii și cercetări lingvistice*, XXVIII, 6, 591-597.
- Kovačec, A., 1971, *Descrierea istroromânei actuale*, București, Editura Academiei.
- Marin, M., M. Tiugan, 2014, *Harta sonoră a graiurilor și dialectelor limbii române*, București, Editura Academiei Române.
- Petrovici, E., 1967, "Elementele sud-slave orientale ale istroromânei și problema teritoriului de formare a limbii române", *Cercetări de lingvistică*, XII, 1, 11-19.
- Pușcariu, S., 1926, *Studii istroromâne*, în colaborare cu M. Bartoli, A. Belulovici și A. Byhan, II. *Introducere – Gramatică – Caracterizarea dialectului istroromân*, București, Cultura Națională.
- Sârbu, R., V. Frățilă, 1998, *Dialectul istroromân. Texte și glosar*, Timișoara, Editura Amarcord.